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CONTENTS

FIRE TESTS OF PARTITIONS

The Bureau's studies of the permanence, economy, and safety of building constructions have included many fire tests. In Building Materials and Structures Report BMS71, which has just been released, tests to determine the effectiveness of wood- and metal-framed partitions as barriers to the spread of fire within buildings are described. Considering the number of types and tests included, a comparatively wide range of constructions is made available, from which selections can be made for a given purpose.

The tests covered solid and hollow partitions of both combustible and incombustible constructions. The facings were, for the most part, boards or plaster. The limit of protection was assumed to have been reached when failure under the applied working load, collapse, or passage of flame occurred, or otherwise, when the temperature on the side not exposed to fire reached limits that might cause ignition of combustible materials in contact therewith. For ratings of 1 hr or more the partitions must also have withstood a hose stream application. The general method of conducting the tests and rating the performance is given in more detail in Standard Specifications for Fire Tests of Building Construction and Materials, approved by the American Standards Association.

The partitions framed on 2- by 4-in. wood studs and faced with wood or wood-fiber boards, and those of solid tongued-and-grooved wood construction 1½ to 1⅝ in. thick, were found to be among the most vulnerable to fire. The use of asbestos paper as membranes in these constructions delayed fire penetration and placed them in the 25- to 45-min range, which is comparable to results with facings of flameproofed wood-fiber board or gypsum wallboards. Partitions faced with ½-in. gypsum wallboard and having mineral-wool fill in the form of bats secured by nailing into the sides of the studs attained a 1-hr rating. A 3-in.-thick partition of prefabricated plywood panels filled with mineral wool attained a fire resistance of ¾ hr, and one of the same thickness of prefabricated steel panels filled with expanded vermiculite reached its limit in just under ½ hr, because of tempera-

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ture rise on the unexposed side, but remained a barrier to fire for a longer period.

Wood-stud partitions faced with ½-in. thickness of sanded gypsum or lime plaster over wood lath qualified for the ½-hr rating, which also was reached by the gypsum plaster applied over wood-fiber board. Filling the stud space with mineral wool bats increased the fire resistance with wood lath and gypsum plaster to 1 hr. With lime plaster the mineral-wool fill increased the fire resistance to an average of 40 min. With facings of ½ in. thick 1:2 sanded gypsum plaster on perforated gypsum lath, or of ¾-in. thickness on metal laths, a 1-hr fire-resistance rating was attained. Lime or portland cement plaster facings ¾ in. thick on metal lath gave ½-hr fire resistance, and similar thickness of lime plaster gaged with Keene's cement, gave ¾ hr. Neat fibered gypsum plaster when applied 1 in. thick on expanded-metal lath extended the fire-resistance range for this type of partition up to 2 hr. These constructions, as well as all wood or wood-stud partitions, are rated as "combustible" according to the test specification.

The results with metal-framed hollow partitions differed little from those with wood-framed partitions having the same facings insofar as the rise of temperature on the unexposed surface was concerned, but the former retained their integrity better and remained longer as barriers to the spread of fire. These constructions were framed with formed sheet-steel channels and were of the nonbearing type.

The metal-framed solid plaster partitions were also of the nonbearing type and were framed on a single row of channels to which the metal lath or other plaster base was attached. With metal lath base and plaster having 1 part by weight of gypsum and 2 or 3 parts of sand, a 2½-in. thickness was required for a rating of 1 hr from the standpoint of fire and hose-stream resistance. For these, as for the hollow partitions, the fire resistance for the same thickness was increased to over 2 hr. by the use of unsanded gypsum plaster, to which wood fiber or short asbestos fiber was added to obtain workability. Similar partitions of 1:2 and 1:3 sanded portland cement plaster, 2 to 2½ in. thick, applied in the usual manner with the trowel, qualified for a rating of ½ hr, the fire resistance being limited by cracking and spalling of the plaster. These effects were even more pronounced with a more dense mortar applied as a spray by means of compressed air. However, by substituting sawdust for one-half of the volume of the sand these effects were almost entirely eliminated and the 1-hr. fire resistance was obtained with a 2½-in. thickness.

The above fire-resistance periods are to be understood as applying to the construction as a whole. Any wood framing will be ignited and may be burning freely before failure under load, passage of flame, or other limiting condition is reached. However, from temperature indications at points between the fire-exposed facing and the studs, information was obtained on the effectiveness of the facings as protection to the wood framing. The general limits of this protection were found to be from one-sixth to one-third of the fire resistance of the partition as such. The lowest was 5 min for facing of ½-in. wood-fiber board and the highest 35 min for 1 in. of neat fibered gypsum plaster on metal lath. For the same kind and thickness of plaster, the board plaster bases gave more protection than application on metal lath.

On the basis of the data obtained in this series of tests, fire-resistance ratings for 64 different partition constructions have been derived. For several of them values for two or three thicknesses are given. For incombustible materials not subject to decided cracking or spalling as exposed to the furnace test, it was found that the fire resistance, as limited by the temperature rise on the side not exposed to fire, varied approximately with the 1.7 power of the thickness of solid partitions or combined thickness of facings for those of hollow type. This is in fair agreement with relations derived from the theory of heat conduction.

Copies of BMS71 are obtainable from the Superintendent of Documents, Government Printing Office, Washington, D. C., at 20 cents each.

THERMAL EXPANSION OF BUILDING BRICK

In order to obtain data useful to designers of brick masonry structures, the thermal expansion of 139 bricks representing 1 sample of sand-lime, 9 of fire-clay, and 61 of clay and shale bricks was measured by Culbertson W. Ross, using Tuckerman optical strain gages over the temperature range —10° to +40°C (14° to 104°F). The gages were calibrated against bars of known thermal expansion.

The coefficients of thermal expansion were: Clay bricks, 4.2 and 12.4 millionth per °C (2.3 to 6.9 per °F), with an average of 6.0 (3.3); shale bricks,

4.7 and 6.8 (2.6 to 3.8), with an average of 6.1 (3.4); fire-clay bricks, 3.0 and 4.6 (1.7 to 2.6), with an average of 3.9 (2.2). The coefficient of the one sample of sand-lime brick was 10.5 (5.8). The coefficients of 87 percent of the clay and shale bricks were within the range 5 to 7 (2.8 to 3.9).

In RP1414 in the Journal of Research for August, the compressive strength, modulus of rupture, 5-hour boiling absorption, 24-hour water absorption, and the saturation coefficient are given for each brick. No relation was observed between the thermal expansion and these properties.

MODULUS OF RUPTURE OF BEAMS

It has long been evident, from the results of tests to determine the strength of materials, that even duplicate specimens will almost invariably differ in strength, sometimes quite markedly. This inherent variation is readily understandable in a heterogeneous material such as concrete, composed of cement and various sizes of aggregate. The interarrangement of the aggregate particles would naturally be expected to cause strength variations.

The strength of the elementary volumes composing a structural unit will vary, and at a given stress the weakest portion will determine the location of the failure. In a paper before the Chicago meeting of the American Society for Testing Materials on June 26, John Tucker, Jr., showed that, by using the mathematical theory of probability, it is possible, if the distribution of strengths of small elements of volume of the material be known, to compute the mean strengths of larger units composed of specified numbers of these small elements; it is also possible to compute the mean strength, and the scatter in strengths, of structural units of a given size from the mean strength and strength scatter of similar units of different known dimensions.

To illustrate the method, consider a very long chain of links, which are uniform within the limits of modern machine production. Every link would appear to be alike.

If, however, single links are cut from the chain, in some ordered manner, such as every hundredth link, and these individual links are tested in tension, the strengths would not all be alike but would be scattered, the degree of scatter varying with the control of material and manufacturing process. The mean strength of these selected links could be computed, and the scatter could be expressed in terms of the standard deviation or some other parameter commonly used in statistical analysis.

If now the remaining chains of 97 links (2 links having been lost by cutting to obtain the single links) are tested, a set of strengths will be obtained which will also be scattered. The average strength of the chains, however, will be less than the average strength of the single links originally tested, because in each chain the weakest of the 97 links will fail. On the average, the same strengths as for the chains would be obtained if the single links were grouped in order in lots of 97, and the weakest link in each lot of 97 were selected.

By the mathematical theory of probability the mean strength and scatter in strengths of chains of any specified length can be computed from the mean strength and the scatter in strengths of single links.

The theory, as developed by Mr. Tucker, has been applied to the strength of beams, and has provided an explanation why, for example, beams centrally loaded have a greater modulus of rupture on the average than beams loaded at the third point; and why increasing the length or the depth of beams decreases their mean modulus of rupture and decreases the scatter of the moduli of rupture.

AIR CONTENT OF FRESH CONCRETE

It has been indicated that the air content of freshly placed concrete is a factor which may greatly affect its properties, particularly its weather resistance.

The amount of air in concrete may be estimated from a knowledge of the apparent specific gravities of the materials, the proportions, and the weight of a known volume of the concrete. A new and improved method for the air-content determination has been developed by G. L. Pigman. In this method the measured volume of concrete is inundated with water, vacuum is applied, and the container is agitated by rolling in order to release the air bubbles. The volume of air released is measured by replacement with water.

Reproducible results were obtained by this method on fairly wet concretes, but the results upon drier concretes were less consistent. This may be attributed to the fact that drier mixes cannot be uniformly compacted into the forms.

The use of a finer sand resulted in the incorporation of much more air;

more cement in the mix slightly reduced the air content. A number of grinding aids, when added to the concrete, increased the air content from the normal of 1 percent to as high as 14 percent approximately. Fly ash did not appreciably change the air content.

SULFATE RESISTANCE OF PORTLAND CEMENTS

In extensive areas of the West-Central portion of the United States and Canada, many clays and soils occur which contain several percent of sulfates, particularly sodium sulfate. The action of these "alkali" soils on portland cement mortar or concrete results in the conversion of the hydrated calcium aluminate of the set cement to calcium sulfoaluminate and gypsum, accompanied by marked expansion. Complete disintegration of the mortar or concrete may eventually occur.

Methods by which the sulfate resistance of portland cement mortar or concrete may be improved, include the following: (1) Steaming the mortar or concrete; (2) prolonged curing of the mortar or concrete at ordinary temperatures; (3) mixing the cement with a puzzolanic material; (4) increasing the glass content of the cement; (5) altering the chemical composition of the cement.

Experiments by E. P. Flint and Lansing S. Wells which are reported in the Journal of Research for August (RP1411), show that the above methods are effective because they bring about the removal from the set cement of tricalcium aluminate hexahydrate, which is unstable in sodium sulfate solutions, and the formation in its place of silica- or iron-containing hydrogarnets, which are stable in such solutions.

Products having an X-ray structure nearly identical with that of grossularite garnet were obtained when mixtures of beta-dicalcium silicate, lime, and dehydrated kaolin were steamed at 500°C and 420 atmospheres. Dicalcium silicate and tricalcium silicate are major constituents of portland cement and dehydrated clay, or kaolin, is a common puzzolanic cement admixture.

BEHAVIOR OF CALCIUM SULFATE AT HIGH TEMPERATURES

The behavior of pure calcium sulfate is of interest in considering the properties of those types of calcium sulfate cements or plasters which are prepared by heating the raw material to a very high temperature. Several plants are in existence abroad at which calcium sulfate is used as one of the raw materials for the manufacture of portland cement and sulfuric acid, advantage being taken of the decomposition of calcium sulfate to lime and sulfur trioxide at high temperatures. This decomposition is presumably responsible in part for the absence of $CaSO_4$ in many portland cement clinkers made in the ordinary way, as has been reported recently by this Bureau.

Naturally occurring calcium sulfate is found in two forms, as gypsum with two molecules of water of crystallization and as anhydrite with no water of crystallization. The latter form is referred to as the beta, or ordinary low-temperature modification. Two other forms can readily be prepared, the hemihydrate, $CaSO_4.1/2H_2O$, of which plaster of paris is largely composed, and an extremely hygroscopic anhydrous form, soluble anhydrite, which changes rapidly to hemihydrate at ordinary temperatures in the presence of water vapor. A third form of anhydrous calcium sulfate occurs but is formed and exists only at high temperatures. This is known as the alpha modification and changes rapidly to the ordinary form when cooled.

In an investigation by Edwin S. Newman reported in the August Journal of Research (RP1413), differential heating curves were used to study the behavior of calcium sulfate at high temperatures. After cooling the material it was examined by means of the petrographic microscope and by study of its X-ray pattern. It was found that the beta- to alpha-transition occurs at approximately 1,214° C and the conclusion of its discoverer—that the high temperature form cannot be cooled to room temperature for study—was confirmed. At the high temperatures at which the alpha modification is formed, a eutectic mixture of alpha calcium sulfate and the lime formed by the decomposition of $CaSO_4$ appears to exist. The eutectic temperature is approximately 1,365° C. The existence of basic sulfates of calcium which have been reported by other writers was not confirmed by this investigation.

RESISTANCE OF PLASTICS TO CHEMICAL REAGENTS

In tabulating data on plastics for handbooks and manufacturers' bulletins, information on the effect of chemical reagents is generally included. The selection of compounds and concentrations for use in such tests was given

early consideration by ASTM Committee D-20 on Plastics, and Tentative Method of Test D543-39 T for resistance of plastics to chemical reagents was included in the first group of methods adopted by that committee. This not only provided a uniform test procedure for use in purchase specifications, but insured comparable data on new and on the older varieties of plastics.

The Organic Plastics Section of the Bureau cooperated in the exploratory investigation undertaken while preparing the ASTM test method. The following plastics were examined: Molded, cast and paper-base laminated phenol-formaldehyde resin; molded and paper-base laminated urea-formaldehyde resin; molded and cast polystyrene; cast methyl methacrylate resin; vinyl chloride-acetate resin; vinyl butyral resin; cold-molded bituminous plastic; cold-molded phenolic plastic; cellulose nitrate; cellulose acetate; ethylcellulose; and casein plastic. The resistance of these materials to all standard and supplementary reagents listed in the ASTM method was determined. These included weak and strong acids, weak and strong alkalies, salt solutions, hydrogen peroxide, and organic solvents. Changes in the weight, dimensions, and appearance of the test specimens were recorded. These experimental data were reported in a paper by G. M. Kline, R. C. Rinker, and H. F. Meindl, presented at the annual meeting of the American Society for Testing Materials in Chicago on June 24.

The limitations of these results as well as those of other tests for determining the permanence of plastics should be recognized. The choice of types and concentrations of reagents, duration of immersion (7 days), temperature of the test (25° C), and properties to be reported upon, is necessarily arbitrary and serves primarily as a guide to investigators who wish to compare the relative resistance of various plastics to chemicals. For applications involving continuous immersion, the data obtained in a short-time test are of interest only in eliminating the most unsuitable materials. Those with special problems must necessarily modify the duration of contact with the chemical, the temperature of the system, and such physical tests as may be used, to meet their particular needs.

CHEMICAL DURABILITY OF GLASS

Donald Hubbard and Edgar H. Hamilton have applied an interferometer method for determining the chemical durability of glass to a series of glasses over a wide range of conditions of time, temperature, and pH. The results, which are given in the August Journal of Research (RP1409), emphasize the fact that there can be no single test by which the durability of glass can be judged with respect to all conditions of service. The method has been particularly helpful in accounting for many of the anomalies of the glass electrode.

CHEMICAL REACTIONS OF THE CHLORITES WITH CARBOHYDRATES

Interest in the chemistry of the chlorites has recently been stimulated by the commercial production of sodium chlorite. Until a few months ago the literature afforded only meager information about the general chemistry of the chlorites, and knowledge of their chemical behavior with the carbohydrates was limited to the fact that sodium chlorite bleaches the objectionable colored substances in paper and cotton textile materials without weakening the cellulose fibers. A reagent possessing the desirable properties of sodium chlorite should find extensive use in the field of carbohydrate chemistry. To provide a guide for the application of the reagent and to determine how the characteristic groups and structures occurring in the carbohydrates react with chlorites, Allene Jeanes and Horace S. Isbell undertook a systematic investigation of the reactions of chlorites with carbohydrate material of diverse character.

As set forth in the August number of the Journal of Research (RP1408), this investigation has shown that at room temperature the nonreducing disaccharide, sucrose, is completely inert to chlorites under all conditions which do not involve acid hydrolysis, and that the ketoses, the polyhydroxy alcohols, and the aldonic acids are attacked only after treatment with chlorites for many days. In marked contrast to the glycosides, polyhydroxy alcohols, aldonic acids, and ketoses, the aldoses are oxidized readily and give the corresponding aldonic acids.

The aldopentoses are oxidized more rapidly than the aldohexoses and the monosaccharides more rapidly than the disaccharides. The reaction is slow in neutral solution but rapid in acid solution. Quantitative measurements under various conditions have revealed that chlorous acid is the oxidant and that

the reaction corresponds in large measure to the following equation:

$$(\text{Aldose}) + 3HClO_2 \longrightarrow (\text{aldonic acid}) + 2ClO_2 + HCl + H_2O.$$

QUANTITATIVE DETERMINATION OF FLUORINE IN ORGANIC COMPOUNDS

As the industrial application of organic fluorine derivatives has increased, especially for refrigeration, plastics, solvents, insecticides, etc., the quantitative determination of fluorine in these compounds becomes more important. Numerous methods have been devised, obviously for obtaining the one that is most convenient. In the Journal of Research for August (RP1406), Dirk H. Brauns describes a new method which is based on the loss in weight of a glass container by the etching action of hydrofluoric acid generated by the decomposition of the organic fluorine compound by sulfuric acid and potassium nitrate. The method, which could be adapted for volatile derivatives, is very simple and can be performed in a short time; it requires no expensive apparatus or elaborate set-up.

MICROSCOPIC STRUCTURE OF THE WOOL FIBER

A growing wool fiber consists of a root and shaft, the former being the living region situated beneath the surface of the skin, whereas the latter is the nonliving portion that extends above the skin surface. Increase in length of the fiber is brought about by the proliferation of new cells in the root and the subsequent emergence of these cells into the shaft. The latter is composed of dead cellular units which usually are arranged in three layers, an outer layer of scales, a middle region called the cortex, and a central core, or medulla. The relative thickness of each of these layers varies considerably in different fibers. Kemp, for example, has a large medulla, whereas in the best grades of wool the medulla is either absent or very small. An investigation was undertaken by Charles W. Hock, Robert C. Ramsay, and Milton Harris, research associates of the Textile Foundation at the Bureau, to obtain information concerning the fine details of structure of wool fibers and especially of their constituent scale and cortical cells.

The cortex was found to consist of spindle-shaped cells. Near the center of each cell is a nucleus which has a granular structure, and which differs in its staining reactions from the rest of the cell. Upon handling single cortical cells with the fine glass needles of a micromanipulator, they can be dissected into many fibrils, indicating that their striated appearance is due to the presence of fibrils and not merely to surface irregularities. In polarized light, the fibrillar part of the cortical cells appears birefringent whereas the nucleus does not.

The scales show little internal organization such as that exhibited by the cortical cells. Unlike the cells of the cortex they are not appreciably affected by pepsin. They usually remain attached to each other in the form of tubes corresponding to their arrangement in intact fibers, and are found to overlap in a manner comparable to the arrangement of shingles on a roof. Both before and after staining, the scales show practically no birefringence.

Since the cells of the root are alive and growing, whereas the cells of the shaft are dead, it is not surprising to find physical and chemical differences between these two regions of the hair. In addition to microscopically detectable differences in structure between the cells in the root and those in the shaft, microchemical color tests also show dissimilarities. The nuclei in the cells of the root react positively to a test which shows that they contain nucleic acid, whereas the nuclei in the cells of the shaft give a negative test. When fibers are examined in polarized light the shaft appears birefringent, whereas the root does not. These, and other observations clearly indicate that as the living cells of the root emerge into the shaft a number of physical and chemical changes take place simultaneously.

When wool is treated with chlorine water, vesicles, or sacs, are formed on the surface of the fibers (Allwörden reaction). That the formation of these sacs is in some way associated with the scales has been suggested by many investigators. Conflicting views prevailed, however, as to whether the sacs arose solely from the scales or whether the latter were merely pushed out by a swelling of a layer of material which lay beneath them. In the present investigation, as reported in full in the Journal of Research for August (RP1412), evidence was obtained in support of the view that the sacs arise in the scales alone. It was found that when fibers are placed in chlorine water the upper and lower surfaces of each scale cell separate to form a swelling.

THERMAL EXPANSION OF CHROMIUM

In the Journal of Research for August (RP1407), Peter Hidnert presents data on the linear thermal expansion of six samples of chromium (99.2 to 96.3 percent) at various temperatures between —190° and +707° C. The expansion curves indicated anomalies at low temperatures. These anomalies were reversible on heating and cooling. The temperature at which anomalous expansion occurs, appears to decrease with decrease in the purity of the chromium. Hysteresis was not observed on heating cast or swaged chromium to 300° C and cooling to low temperatures. Exceptionally low average coefficients of expansion were found for temperature ranges in or near the anomalous critical regions. The average coefficients of expansion of the samples of chromium from 20° C to various temperatures between 100° and 700° C, lie between 5.7×10^{-6} and 10.3×10^{-6} per degree centigrade.

TOUGHNESS OF MEDIUM-CARBON FORGING STEEL

In order to guard against sudden failure of materials used in structures, engineers demand a certain amount of toughness in steels. A common method of evaluating this quality is the impact test of notched specimens, and factors affecting the impact-toughness of steels are naturally of considerable interest to engineers.

Samuel J. Rosenberg and Daniel H. Gagon have studied the relation between grain size and heat treatment and the impact-toughness of steel, particularly as affected by low temperatures. Most steels lose toughness (i. e., become brittle) quite rapidly as the temperature is decreased. The range of temperature wherein this change occurs is a reliable criterion of the relative toughness of steels—the lower the temperature at which toughness is lost, the better the steel.

As explained in RP1410 in the August Journal of Research, six heats of the same type of steel (a medium-carbon forging steel), made so as to have different grain sizes, were studied. It was found that, as hot-rolled, no relation existed between grain size and toughness, and all the steels were quite brittle. Normalizing (heating to 1600° F and air cooling) caused some improvement in toughness, and when so treated the fine-grained steels were tougher than the coarse-grained steels. Proper heat treatment (hardening and tempering) resulted in a marked improvement in the toughness of the steels, but in this condition there was no relation between grain size and toughness in the heat-treated steels.

The authors conclude that each individual heat of this type of steel has an inherent resistance to impact, characteristic of that particular heat, and that this impact resistance is dependent upon factors not at present recognized.

REVISED SIMPLIFIED PRACTICE RECOMMENDATION FOR HOSPITAL PLUMBING FIXTURES

Simplified Practice Recommendation R106–41, Hospital Plumbing Fixtures, became effective on July 1, 1941. This is a revision of the original edition promulgated in 1930. The recommendation covers a simplified schedule of types and sizes of plumbing fixtures for hospital use, and includes references to grading rules, nomenclature, and definitions for porcelain ware, vitreous china plumbing fixtures, sanitary cast-iron enameled ware, and earthenware.

The publication includes, in addition to the simplified schedule, a brief history of the project, and lists the members of the standing committee and the acceptors. Until the printed issue is available, free mimeographed copies of this revision may be obtained from the Division of Simplified Practice, National Bureau of Standards, Washington, D. C.

CODE FOR ELECTRICITY METERS

The fourth edition of the Code for Electricity Meters was approved by the American Standards Association on May 5, 1941, and was issued in June. The scope of the code as defined by the ASA is as follows:

"Standards of practice for the maintenance and accuracy of watt-hour meters, demand devices and auxiliary apparatus. Summary of good practice for the installing of meters and auxiliaries. Definitions of units and technical terms relating to watt-hour meters."

The present edition was prepared by an ASA sectional committee, including representatives of six organizations in the electrical industry, three State utility commissions, and the National Bureau of Standards, under the joint sponsorship of the Bureau, the Association of Edison Illuminating Companies, and

the Edison Electric Institute. Copies of the code (128 pages, bound in cloth) may be obtained for $2.00 each from the Edison Electric Institute, 420 Lexington Avenue, New York, N. Y., or the American Standards Association, 29 West 39th Street, New York, N. Y.

TABLE OF NATURAL LOGARITHMS

The Bureau is acting as sponsor and distributing agency for a series of mathematical tables which are being prepared by the Work Projects Administration under the direction of Arnold N. Lowan. The seventh of these tables to be issued is the first of a series of four volumes giving values of the natural logarithms to 16 places of decimals. This particular volume covers the integers from 1 to 50,000.

In the range and value of the argument, that is, in the number of significant figures of the argument and also the number of decimal places of the logarithm, these tables supersede all others. They should prove particularly convenient to engineers and other practical computers who have frequent use for natural logarithms and wish to obtain them with the least possible effort and in the shortest time.

Remittance must accompany order and should be sent to National Bureau of Standards, Washington, D. C. The price for this volume, which contains 523 pages bound in buckram, is $2.00.

NEW AND REVISED PUBLICATIONS ISSUED DURING JULY 1941

Journal of Research [2]

Journal of Research of the National Bureau of Standards, volume 26, number 6, June 1941 (RP1390 to RP1397, inclusive). Price 30 cents. Annual subscription, 12 issues, $3.50.

Research Papers [2]

[Reprints from June 1941 Journal of Research]

RP1391. Analysis of dental amalgams containing mercury, silver, gold, tin, copper, and zinc. Harold J. Caul and Irl C. Schoonover. Price 5 cents.

RP1392. X-ray studies of compounds in the system PbO–B_2O_3 and K_2O–PbO–SiO_2. Howard F. McMurdie. Price 5 cents.

RP1393. Slopes of pv isotherms of He, Ne, A, H_2, N_2, and O_2 at 0° C. Carl S. Cragoe. Price 10 cents.

RP1394. Comparative tests of chemical glassware. Edward Wichers, Alfred N. Finn, and W. Stanley Clabaugh. Price 10 cents.

RP1395. Spectrophotometric determination of praseodymium, neodymium, and samarium. Clement J. Rodden. Price 5 cents.

RP1396. Critical study of the determination of carbon monoxide by combustion over platinum in the presence of excess oxygen. Joseph R. Branham, Martin Shepherd, and Shuford Schuhmann. Price 10 cents.

RP1397. Determination of freezing points and amounts of impurity in hydrocarbons from freezing and melting curves. Beveridge J. Mair, August R. Glasgow, Jr., and Frederick D. Rossini. Price 10 cents.

Building Materials and Structures

Reports [2]

[Persons who wish to be notified of new publications in the Building Materials and Structures series as soon as they are available should write to the Superintendent of Documents, Government Printing Office, Washington, D. C., asking that their names be placed on the special mailing list maintained by him for this purpose.]

BMS71. Fire tests of wood- and metal-framed partitions. S. H. Ingberg and Nolan D. Mitchell. Price 20 cents.

Simplified Practice Recommendations [2]

R68–41. Metal and nonconducting flashlight cases. (Supersedes R68–33.) Price 5 cents.

R70–41. Salt packages. (Supersedes R70.) Price 5 cents.

Commercial Standards [2]

CS60E–41. Hardwood dimension lumber (exports). Price 5 cents.

Technical News Bulletin [2]

Technical News Bulletin 291, July 1941. Price 5 cents. Annual subscription, 50 cents.

[2] Send orders for publications under this heading only to the Superintendent of Documents, Government Printing Office, Washington, D. C. Subscription to Technical News Bulletin, 50 cents per year; Journal of Research, $3.50 per year (to addresses in the United States and its possessions and to countries extending the franking privilege); other countries, 70 cents and $4.50, respectively.

MIMEOGRAPHED MATERIAL

Letter Circulars

[Letter Circulars are prepared to answer specific inquiries addressed to the National Bureau of Standards and are sent only on request to persons having definite need for the information. The Bureau cannot undertake to supply lists or complete sets of Letter Circulars or send copies automatically as issued.]

LC645. Methods of using standard frequencies broadcast by radio. (Supersedes LC567.)

LC648. Home-heating problems: List of publications and articles. (Supersedes LC284.)

LC652. Fluorescent lamps.

LC654. List of Simplified Practice Recommendations. (Supersedes LC629.)

RECENT BUREAU ARTICLES APPEARING IN OUTSIDE PUBLICATIONS[3]

Magnetism and its uses. Paul R. Heyl. Proc. Am. Philosophical Soc. (Independence Square, Philadelphia, Pa.), 84, 339 (May 1941).

Note on the measurement of the permeability of leather to water vapor. Robert B. Hobbs. J. Am. Leather Chemists Assn. (Ridgway, Pa.) 36, 346 (June, 1941).

Report of the Secretary, Horological Institute of America, Twenty-first Annual Meeting. R. E. Gould. J. Horological Inst. Am. (% National Bureau of Standards, Washington, D. C.), No. 9, 10 (June 1941).

Pitting and its effect on the fatigue limit of steels corroded under various conditions. D. J. McAdam and G. W. Geil. Preprint 33 Am. Soc. Testing Materials (260 South Broad St., Philadelphia, Pa.) (June 1941).

Influence of austenitic grain size on the critical cooling rate of high-purity iron-carbon alloys. T. G. Digges. Trans. Am. Soc. Metals (7301 Euclid Ave., Cleveland, Ohio) 29, 285 (June 1941).

Comparative tests of chemical glassware. Edward Wichers, Alfred N. Finn, and W. Stanley Clabaugh. Ind. Eng. Chem. Analytical Ed. (1155 16th St., NW., Washington, D. C.) 13, 419 (June 1941).

The resistivity of interstellar space. Fred L. Mohler. Physical Rev. (Am. Inst. of Physics, 175 Fifth Ave., New York, N. Y.) 59, 1043 (June 15, 1941).

[3] These publications are not obtainable from the Government. Requests should be sent direct to the publishers.

U. S. GOVERNMENT PRINTING OFFICE: 1941